

FILE 'REGISTRY' ENTERED AT 13:23:07 ON 06 DEC 2005

=> S PHZO/CN

L1 0 PHZO/CN

=> S PHZO

L2 3 PHZO

=> D 1-3

L2 ANSWER 1 OF 3 REGISTRY COPYRIGHT 2005 ACS on STN

RN 685917-72-0 REGISTRY

ED Entered STN: 26 May 2004

CN DNA (*Pseudomonas chlororaphis* gene phzO plus flanks) (9CI) (CA INDEX NAME)

OTHER NAMES:

CN 1: PN: US6737260 SEQID: 1 claimed DNA

FS NUCLEIC ACID SEQUENCE

MF Unspecified

CI MAN

SR CA

LC STN Files: CA, CAPLUS, USPATFULL

\*\*RELATED SEQUENCES AVAILABLE WITH SEQLINK\*\*

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

\*\*\* USE 'SQD' OR 'SQIDE' FORMATS TO DISPLAY SEQUENCE \*\*\*

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 2 OF 3 REGISTRY COPYRIGHT 2005 ACS on STN

RN 347917-58-2 REGISTRY

ED Entered STN: 24 Jul 2001

CN Phenazine hydroxylase (*Pseudomonas aureofaciens* gene phzO) (9CI) (CA INDEX NAME)

OTHER NAMES:

CN GenBank AAG17551

CN GenBank AAG17551 (Translated from: GenBank AF230879)

FS PROTEIN SEQUENCE

MF Unspecified

CI MAN

SR CA

LC STN Files: CA, CAPLUS

\*\*RELATED SEQUENCES AVAILABLE WITH SEQLINK\*\*

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

\*\*\* USE 'SQD' OR 'SQIDE' FORMATS TO DISPLAY SEQUENCE \*\*\*

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 3 OF 3 REGISTRY COPYRIGHT 2005 ACS on STN

RN 292592-57-5 REGISTRY

ED Entered STN: 03 Oct 2000

CN DNA (*Pseudomonas aureofaciens* gene phzO plus gene ggtB fragment plus 5'-flank) (9CI) (CA INDEX NAME)

OTHER NAMES:

CN GenBank AF230879

FS NUCLEIC ACID SEQUENCE

MF Unspecified

CI MAN

SR GenBank

LC STN Files: CA, CAPLUS, GENBANK

\*\*RELATED SEQUENCES AVAILABLE WITH SEQLINK\*\*

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

\*\*\* USE 'SQD' OR 'SQIDE' FORMATS TO DISPLAY SEQUENCE \*\*\*

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

=> S MONOOXYGENASE/CN

L3 1 MONOOXYGENASE/CN

=> D

L3 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2005 ACS on STN

RN 9038-14-6 REGISTRY

ED Entered STN: 16 Nov 1984

CN Oxygenase, mono- (9CI) (CA INDEX NAME)

OTHER NAMES:

CN Cytochrome P 450 hydroperoxidase

CN Cytochrome P 450 monooxygenase

CN Cytochrome P 450-linked monooxygenase

CN Cytochrome P-450 mixed-function oxidase

CN E.C. 1.14.14.1

CN E.C. 1.14.14.2

CN HCE hydroxylase

CN Microsomal monooxygenase

CN Mixed function monooxygenase

CN Mixed-function oxidase

CN Mixed-function oxygenase

CN Monooxygenase

CN Oxidase, mixed function

DR 9040-60-2, 55963-41-2, 62213-32-5

MF Unspecified

CI MAN

LC STN Files: ADISNEWS, AGRICOLA, ANABSTR, BIOBUSINESS, BIOSIS, BIOTECHNO,  
CA, CAPLUS, CASREACT, CEN, CIN, CSNB, EMBASE, IFICDB, IFIPAT, IFIUDB,  
PIRA, PROMT, TOXCENTER, ULIDAT, USPAT2, USPATFULL

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

6774 REFERENCES IN FILE CA (1907 TO DATE)

31 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA

6781 REFERENCES IN FILE CAPLUS (1907 TO DATE)

FILE 'CAPLUS' ENTERED AT 13:23:57 ON 06 DEC 2005

=> S PHZO;S MONOOXYGENASE;S L1;S 12;S PHENAZINE

L4 2 PHZO

13165 MONOOXYGENASE

3025 MONOOXYGENASES

L5 14135 MONOOXYGENASE

(MONOOXYGENASE OR MONOOXYGENASES)

L6 0 L1

L7 1355282 12

7256 PHENAZINE  
676 PHENAZINES  
L8 7410 PHENAZINE  
(PHENAZINE OR PHENAZINES)

=> S L3

L9 6782 L3

=> S L4 OR L2

2 L2  
L10 2 L4 OR L2

=> S PSEUDOMONAS

73399 PSEUDOMONAS  
22 PSEUDOMONADES  
L11 73403 PSEUDOMONAS  
(PSEUDOMONAS OR PSEUDOMONADES)

=> S L11 AND L 10

1446659 L  
3672537 10  
3213 L 10  
(L(W)10)  
L12 15 L11 AND L 10

=> S L11 AND L10

L13 2 L11 AND L10

=> S L11 AND L8

L14 523 L11 AND L8

=> S L8(6A) (L3,L5)

6782 L3  
L15 4 L8(6A) ((L3 OR L5))

=> S L13,L5

L16 14135 (L13 OR L5)

=> S L13,L15

L17 4 (L13 OR L15)

=> D 1-4 CBIB ABS

L17 ANSWER 1 OF 4 CAPLUS COPYRIGHT 2005 ACS on STN

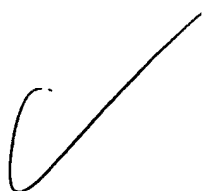
2004:402290 Document No. 140:387063 Use of *Pseudomonas*  
*chlororaphis* phzO gene encoding phenazine-1-carboxylate  
2-monooxygenase for biosynthesis of 2-hydroxylated phenazine compounds and  
inhibition of plant fungal pathogens. Thomashow, Linda S.; Delaney,  
Shannon M.; Mavrodi, Dmitri V.; Weller, David M. (The United States of  
America, as Represented by the Secretary of Agriculture, USA; Washington  
State University Research Foundation). U.S. US 6737260 B1 20040518, 32  
pp. (English). CODEN: USXXAM. APPLICATION: US 2001-965175 20010927.  
PRIORITY: US 2000-2000/PV236634 20000929.

AB The invention is directed to use of *Pseudomonas* *chlororaphis* phzO gene encoding  
phenazine-1-carboxylate 2-monooxygenase for biosynthesis of 2-hydroxylated  
phenazine compds. and inhibition of plant fungal pathogens. In particular,  
phenazine-1-carboxylic acid may be converted to 2-hydroxyphenazine-1-carboxylic  
acid (2-OH-PCA) and 2-hydroxyphenazine using phenazine-1-carboxylate 2-  
monooxygenase.

L17 ANSWER 2 OF 4 CAPLUS COPYRIGHT 2005 ACS on STN

2001:779311 Document No. 136:304875 Functional analysis of genes for


biosynthesis of pyocyanin and phenazine-1-carboxamide from *Pseudomonas aeruginosa* PAO1. Mavrodi, Dmitri V.; Bonsall, Robert F.; Delaney, Shannon M.; Soule, Marilyn J.; Phillips, Greg; Thomashow, Linda S. (Department of Plant Pathology, School of Molecular Biosciences, Washington State University, Pullman, WA, 99164-6430, USA). *Journal of Bacteriology*, 183(21), 6454-6465 (English) 2001. CODEN: JOBAAY. ISSN: 0021-9193. Publisher: American Society for Microbiology.



- AB Two seven-gene phenazine biosynthetic loci were cloned from *Pseudomonas aeruginosa* PAO1. The operons, designated *phzA1B1C1D1E1F1G1* and *phzA2B2C2D2E2F2G2*, are homologous to previously studied phenazine biosynthetic operons from *Pseudomonas fluorescens* and *Pseudomonas aureofaciens*. Functional studies of phenazine-nonproducing strains of fluorescent pseudomonads indicated that each of the biosynthetic operons from *P. aeruginosa* is sufficient for production of a single compound, phenazine-1-carboxylic acid (PCA). Subsequent conversion of PCA to pyocyanin is mediated in *P. aeruginosa* by two novel phenazine-modifying genes, *phzM* and *phzS*, which encode putative phenazine-specific methyltransferase and flavin-containing monooxygenase, resp. Expression of *phzS* alone in *Escherichia coli* or in enzymes, pyocyanin-nonproducing *P. fluorescens* resulted in conversion of PCA to 1-hydroxyphenazine. *P. aeruginosa* with insertionally inactivated *phzM* or *phzS* developed pyocyanin-deficient phenotypes. A third phenazine-modifying gene, *phzH*, which has a homolog in *Pseudomonas chlororaphis*, also was identified and was shown to control synthesis of phenazine-1-carboxamide from PCA in *P. aeruginosa* PAO1. Our results suggest that there is a complex pyocyanin biosynthetic pathway in *P. aeruginosa* consisting of two core loci responsible for synthesis of PCA and three addnl. genes encoding unique enzymes involved in the conversion of PCA to pyocyanin, 1-hydroxyphenazine, and phenazine-1-carboxamide.

L17 ANSWER 3 OF 4 CAPLUS COPYRIGHT 2005 ACS on STN

2001:11561 Document No. 135:87793 *phzC*, a gene for biosynthesis of 2-hydroxylated phenazine compounds in *Pseudomonas aureofaciens* 30-84. Delaney, Shannon M.; Mavrodi, Dmitri V.; Bonsall, Robert F.; Thomashow, Linda S. (School of Molecular Biosciences, Washington State University, Pullman, WA, 99164-4234, USA). *Journal of Bacteriology*, 183(1), 318-327 (English) 2001. CODEN: JOBAAY. ISSN: 0021-9193. Publisher: American Society for Microbiology.



- AB Certain strains of root-colonizing fluorescent *Pseudomonas* spp. produce phenazines, a class of antifungal metabolites that can provide protection against various soilborne root pathogens. Despite the fact that the phenazine biosynthetic locus is highly conserved among fluorescent *Pseudomonas* spp., individual strains differ in the range of phenazine compds. they produce. This study focuses on the ability of *Pseudomonas aureofaciens* 30-84 to produce 2-hydroxyphenazine-1-carboxylic acid (2-OH-PCA) and 2-hydroxyphenazine from the common phenazine metabolite phenazine-1-carboxylic acid (PCA). *P. aureofaciens* 30-84 contains a novel gene located downstream from the core phenazine operon that encodes a 55-kDa aromatic monooxygenase responsible for the hydroxylation of PCA to produce 2-OH-PCA. Knowledge of the genes responsible for phenazine product specificity could ultimately reveal ways to manipulate organisms to produce multiple phenazines or novel phenazines not previously described.

L17 ANSWER 4 OF 4 CAPLUS COPYRIGHT 2005 ACS on STN

1978:419938 Document No. 89:19938 Oxidation of monocarbon compounds by bacteria of different genera. Troyan, O. S.; Netrusov, A. I.; Skirdov, I. V.; Kondrat'eva, E. N. (Moscow State Univ., Moscow, USSR). *Prikladnaya Biokhimiya i Mikrobiologiya*, 14(2), 202-7 (Russian) 1978. CODEN: PBMIAX. ISSN: 0555-1099.

- AB The methylotrophic bacteria, *Pseudomonas* species, *Brevibacterium* species, and *Mycobacterium* species, were capable of O uptake when cultivated in a mineral medium containing MeOH, CH<sub>2</sub>O, formate, EtOH, acetate, succinate, or malate. When cultivated on methylated amines, O uptake occurred with some but not all strains. Enzymes catalyzing Me<sub>2</sub>NH oxidation were NADH-dimethylamine monooxygenase,

phenazine methosulfate (PMS)-dependent methylamine dehydrogenase, and PMS-dependent formaldehyde dehydrogenase. Oxidation of Me<sub>2</sub>NH and Me<sub>3</sub>N by *Brevibacterium* was catalyzed by NAD- and NADH-dependent oxygenases and dehydrogenases.

=> S PHZO

L18 2 PHZO

=> S L18 NOT L17

L19 0 L18 NOT L17

=> S HYDROX?(W) PHENAZINE

1463106 HYDROX?

7256 PHENAZINE

676 PHENAZINES

7410 PHENAZINE

(PHENAZINE OR PHENAZINES)

L20 38 HYDROX?(W) PHENAZINE

=> S L20 AND L11

L21 10 L20 AND L11

=> S L21 NOT L17

L22 8 L21 NOT L17

=> D 1-8 CBIB ABS

L22 ANSWER 1 OF 8 CAPLUS COPYRIGHT 2005 ACS on STN

2003:745604 Document No. 140:15775 Phenazine-1-carboxylic acid, a secondary metabolite of *Pseudomonas aeruginosa*, alters expression of immunomodulatory proteins by human airway epithelial cells. Denning, Gerene M.; Iyer, Shankar S.; Reszka, Krzysztof J.; O'Malley, Yunxia; Rasmussen, George T.; Britigan, Bradley E. (Department of Internal Medicine, University of Iowa, Iowa City, 52242, USA). American Journal of Physiology, 285(3, Pt. 1), L584-L592 (English) 2003. CODEN: AJPHAP. ISSN: 0002-9513. Publisher: American Physiological Society.

AB *Pseudomonas aeruginosa* is a gram-neg. bacterium that causes both acute and chronic lung disease in susceptible patient populations. *P. aeruginosa* secretes numerous proteins and secondary metabolites, many of which have biol. effects that likely contribute to disease pathogenesis. An unidentified small-mol.-weight factor was previously reported to increase IL-8 release both in vitro and in vivo. To identify this factor, we subjected the <3-kDa fraction from *P. aeruginosa*-conditioned medium to HPLC anal. A peak fraction that stimulated IL-8 release was found by mass spectrometry to have a mol. mass (MM) of 224 Da. On the basis of this MM and other biochem. properties, we hypothesized that the factor was phenazine-1-carboxylic acid (PCA). Subsequent studies and comparison with purified PCA confirmed this hypothesis. Purified PCA exhibited a number of biol. effects in human airway epithelial cells, including increasing IL-8 release and ICAM-1 expression, as well as decreasing RANTES and monocyte chemoattractant protein-1 (MCP-1) release. PCA also increased intracellular oxidant formation as measured by ESR and by an intracellular oxidant-sensitive probe. Antioxidants inhibited PCA-dependent increases in IL-8 and ICAM-1, suggesting that oxidants contributed to these effects. However, in contrast to the related phenazine compound pyocyanin, PCA did not oxidize NAD(P)H at physiol. relevant pH, providing preliminary evidence that PCA and pyocyanin may have distinct redox chemistries within the cell. Thus PCA is a biol. active factor secreted by *P. aeruginosa* that has several activities that could alter the host immune and inflammatory response and thereby contribute to bacterial disease pathogenesis.

L22 ANSWER 2 OF 8 CAPLUS COPYRIGHT 2005 ACS on STN

2002:618007 Electrospray-ionization mass spectrometric study of the metal

induced de-methylation of the natural antibiotic Pyocyanin in aqueous media. Vukomanovic, Dragic; Stone, John A.; Su, Timothy (Department of Chemistry and Biochemistry, University of Massachusetts Dartmouth, North Dartmouth, MA, 02747-2300, USA). Abstracts of Papers, 224th ACS National Meeting, Boston, MA, United States, August 18-22, 2002, MEDI-155.

American Chemical Society: Washington, D. C. (English) 2002. CODEN: 69CZPZ.

- AB The activities of many antibiotics have been related to their abilities to form metal complexes. Pyocyanin (Pyo), 5-methyl-1-phenazinone, is a natural antibiotic produced by an opportunistic pathogen Gram-neg. bacterium *Pseudomonas aeruginosa*. This water-soluble blue pigment is known to be a nitric oxide antagonist and reported to be a precursor of even more potent antibiotic a yellow pigment 1-hydroxy phenazine. Our electrospray ionization mass spectrometric and collisional assisted dissociation (CAD) study of Pyocyanin complexes with a variety of divalent metal ions indicated that metal induced de-methylation of Pyocyanin might be a possible pathway of 1-hydroxy phenazine biosynthesis. Ions, both singly and doubly charged, formed by loss of 15 u (-CH<sub>3</sub>) are important processes in the CAD spectra of the Pyo complexes of Mg<sup>2+</sup>, Ca<sup>2+</sup>, and Ba<sup>2+</sup> but decrease in relative importance with increasing cation size. The propensity for loss of the Me radical from pyocyanin ligand is consistent with the electron impact and metastable mass spectra of substituted phenazines. Structures computed at the B3LYP/6-31G\* levels are in concert with our mass spectrometric findings.

L22 ANSWER 3 OF 8 CAPLUS COPYRIGHT 2005 ACS on STN

1995:989009 Document No. 124:78154 Molecular analysis of genes encoding phenazine biosynthesis in the biological control bacterium *Pseudomonas aureofaciens* 30-84. Pierson, Leland S. III; Gaffney, Thomas; Lam, Stephen; Gong, Fangcheng (Department of Plant Pathology, University of Arizona, Tucson, AZ, 85721, USA). FEMS Microbiology Letters, 134(2-3), 299-307 (English) 1995. CODEN: FMLED7. ISSN: 0378-1097. Publisher: Elsevier.

- AB The DNA sequence of five contiguous open reading frames encoding enzymes for phenazine biosynthesis in the biol. control bacterium *Pseudomonas aureofaciens* 30-84 was determined. These open reading frames were named phzF, phzA, phzB, phzC and phzD. Protein PhzF is similar to 3-deoxy-D-arabino-heptulosonate-7-phosphate synthases of solanaceous plants. PhzA is similar to 2,3-dihydro-2,3-dihydroxybenzoate synthase (EntB) of *Escherichia coli*. PhzB shares similarity with both subunits of anthranilate synthase and the phzB open reading frame complemented an *E. coli* trpE mutant deficient in anthranilate synthase activity. Although phzC shares little similarity to known genes, its product is responsible for the conversion of phenazine-1-carboxylic acid to 2-hydroxy-phenazine-1-carboxylic acid. PhzD is similar to pyridoxamine phosphate oxidases. These results indicate that phenazine biosynthesis in *P. aureofaciens* shares similarities with the shikimic acid, enterochelin, and tryptophan biosynthetic pathways.

L22 ANSWER 4 OF 8 CAPLUS COPYRIGHT 2005 ACS on STN

1995:349036 Document No. 123:79414 Structures and antimicrobial activity of five phenazine pigments isolated from *Pseudomonas aeruginosa*. Badria, Farid A.; El-Naggar, Wael A. (Fac. Pharm., Mansoura Univ., Mansura, 35516, Egypt). Scientia Pharmaceutica, 62(4), 355-62 (English) 1994. CODEN: SCPHA4. ISSN: 0036-8709. Publisher: Oesterreichische Apotheker-Verlagsgesellschaft.

- AB Two hundred and fourteen strains of *Pseudomonas aeruginosa* isolated from various clin. sources were studied. All strains produced fluorescent pigments but some of them produced also pyocyanine; 40% of the strains were apocyanogenic. The crude extract of pigments inhibited the growth of gram pos. bacteria, *C. albicans* and *S. cerevisiae*. A trial was made to prepare, isolate, purify and elucidate the structures of active substances from crude extract. Five major pigments were

characterized by 1D and 2D-NMR and identified as phenazine, 1-hydroxyphenazine, phenazine-1-carboxylate, pyocyanine, and saphenate ester.

L22 ANSWER 5 OF 8 CAPLUS COPYRIGHT 2005 ACS on STN

1994:430972 Document No. 121:30972 Factors affecting antagonism of the growth of *Phanerochaete chrysosporium* by bacteria isolated from soils. Radtke, C.; Cook, W. S.; Anderson, A. (Biol. Dep., Utah State Univ., Logan, UT, 84322-5305, USA). *Applied Microbiology and Biotechnology*, 41(2), 274-80 (English) 1994. CODEN: AMBIDG. ISSN: 0175-7598.

AB Bacteria from polluted and agricultural soils antagonize the growth of *Phanerochaete chrysosporium* on solid media. The antagonistic bacteria in a soil contaminated with trinitrotoluene included fluorescent pseudomonads. Antagonism by fluorescent pseudomonads was variable according to the pH, and carbon and nitrogen sources used in the growth medium. A fluorescent siderophore produced by a *Pseudomonas putida* strain did not inhibit the growth of *Phanerochaete chrysosporium* but pseudomonad isolates capable of producing phenazine derivs. were strongly inhibitory.

L22 ANSWER 6 OF 8 CAPLUS COPYRIGHT 2005 ACS on STN

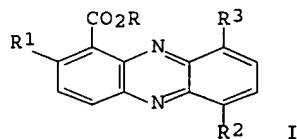
1991:425755 Document No. 115:25755 The formation of hydroxylated phenazines by *Pseudomonas fluorescens* Y4 upon addition of beryllium to the culture medium - a defense mechanism. Taraz, K.; Schaffner, E. M.; Budzikiewicz, H.; Korth, H.; Pulverer, G. (Inst. Org. Chem., Univ. Koeln, Cologne, D-5000/41, Germany). *Zeitschrift fuer Naturforschung, C: Journal of Biosciences*, 46(3-4), 194-6 (German) 1991. CODEN: ZNCBDA. ISSN: 0341-0382.

AB *Pseudomonas fluorescens* Y4 grown in an iron-deficient medium produces increased amts. of 2,9-di- and 2,3,9-trihydroxyphenazine-1-carboxylic acid when Be<sup>2+</sup> is added to the culture. The significance of the formation of these compds. is discussed.

L22 ANSWER 7 OF 8 CAPLUS COPYRIGHT 2005 ACS on STN

1977:106522 Document No. 86:106522 Synthesis of some methoxy- and hydroxy-phenazine-1-carboxylic acids. Brooke, Philip K.; Challand, S. Richard; Flood, Michael E.; Herbert, Richard B.; Holliman, Frederick G.; Ibberson, P. Nicholas (Dep. Org. Chem., Univ. Leeds, Leeds, UK). *Journal of the Chemical Society, Perkin Transactions 1: Organic and Bio-Organic Chemistry* (1972-1999) (21), 2248-52 (English) 1976. CODEN: JCPRB4. ISSN: 0300-922X.

GI



AB Naturally occurring 6- and 9-hydroxyphenazine-1-carboxylic acids (I; R = R<sub>1</sub> = R<sub>3</sub> = H, R<sub>2</sub> = OH; R = R<sub>1</sub> = R<sub>2</sub> = H, R<sub>3</sub> = OH) were prepared by reaction of 2,3-Br(O<sub>2</sub>N)C<sub>6</sub>H<sub>3</sub>CO<sub>2</sub>H with 3- and 2-MeOC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, resp., followed by reductive cyclization with NaBH<sub>4</sub> and demethylation with anhydrous AlCl<sub>3</sub>. Me 6-methoxyphenazine-1-carboxylate (I; R = Me, R<sub>1</sub> = R<sub>3</sub> = H, R<sub>2</sub> = OMe) was identified as a metabolite from *Streptomyces luteoreticuli* and a metabolite of *Pseudomonas aureofaciens* was identified as 2-hydroxyphenazine-1-carboxylic acid (I; R = R<sub>2</sub> = R<sub>3</sub>, R<sub>1</sub> = OH) by comparison with synthetic material.

L22 ANSWER 8 OF 8 CAPLUS COPYRIGHT 2005 ACS on STN

1971:50792 Document No. 74:50792 Biosynthesis of pyocyanin, a phenazine microbial metabolite. Holliman, Frederick G.; Flood, M. E.; Herbert, Richard B. (Dep. Org. Chem., Univ. Leeds, Leeds, UK). Journal of the Chemical Society [Section] D: Chemical Communications (22), 1514-15 (English) 1970. CODEN: CCJDAO. ISSN: 0577-6171.

GI For diagram(s), see printed CA Issue.

AB Tracer expts. have shown that phenazine-1-carboxylic acid (I) and its 5-methyl quaternary salt (II) are incorporated into pyocyanin by *Pseudomonas aeruginosa* by decarboxylative hydroxylation.

=> S L21 NOT L22

L23 2 L21 NOT L22

=> D 1-2 CBIB ABS

L23 ANSWER 1 OF 2 CAPLUS COPYRIGHT 2005 ACS on STN

2004:402290 Document No. 140:387063 Use of *Pseudomonas chlororaphis* phzO gene encoding phenazine-1-carboxylate 2-monooxygenase for biosynthesis of 2-hydroxylated phenazine compounds and inhibition of plant fungal pathogens. Thomashow, Linda S.; Delaney, Shannon M.; Mavrodi, Dmitri V.; Weller, David M. (The United States of America, as Represented by the Secretary of Agriculture, USA; Washington State University Research Foundation). U.S. US 6737260 B1 20040518, 32 pp. (English). CODEN: USXXAM. APPLICATION: US 2001-965175 20010927. PRIORITY: US 2000-2000/PV236634 20000929.

AB The invention is directed to use of *Pseudomonas chlororaphis* phzO gene encoding phenazine-1-carboxylate 2-monooxygenase for biosynthesis of 2-hydroxylated phenazine compds. and inhibition of plant fungal pathogens. In particular, phenazine-1-carboxylic acid may be converted to 2-hydroxyphenazine-1-carboxylic acid (2-OH-PCA) and 2-hydroxyphenazine using phenazine-1-carboxylate 2-monooxygenase.

L23 ANSWER 2 OF 2 CAPLUS COPYRIGHT 2005 ACS on STN

2001:11561 Document No. 135:87793 phzO, a gene for biosynthesis of 2-hydroxylated phenazine compounds in *Pseudomonas aureofaciens* 30-84. Delaney, Shannon M.; Mavrodi, Dmitri V.; Bonsall, Robert F.; Thomashow, Linda S. (School of Molecular Biosciences, Washington State University, Pullman, WA, 99164-4234, USA). Journal of Bacteriology, 183(1), 318-327 (English) 2001. CODEN: JOBAAY. ISSN: 0021-9193. Publisher: American Society for Microbiology.

AB Certain strains of root-colonizing fluorescent *Pseudomonas* spp. produce phenazines, a class of antifungal metabolites that can provide protection against various soilborne root pathogens. Despite the fact that the phenazine biosynthetic locus is highly conserved among fluorescent *Pseudomonas* spp., individual strains differ in the range of phenazine compds. they produce. This study focuses on the ability of *Pseudomonas aureofaciens* 30-84 to produce 2-hydroxyphenazine-1-carboxylic acid (2-OH-PCA) and 2-hydroxyphenazine from the common phenazine metabolite phenazine-1-carboxylic acid (PCA). *P. aureofaciens* 30-84 contains a novel gene located downstream from the core phenazine operon that encodes a 55-kDa aromatic monooxygenase responsible for the hydroxylation of PCA to produce 2-OH-PCA. Knowledge of the genes responsible for phenazine product specificity could ultimately reveal ways to manipulate organisms to produce multiple phenazines or novel phenazines not previously described.

=> E THOMASHOW L/AU

=> S E3-E7

1 "THOMASHOW L"/AU  
10 "THOMASHOW L S"/AU  
5 "THOMASHOW LINDA"/AU  
46 "THOMASHOW LINDA S"/AU  
1 "THOMASHOW LINDA SIBLEY"/AU  
L24 63 ("THOMASHOW L"/AU OR "THOMASHOW L S"/AU OR "THOMASHOW LINDA"/AU  
OR "THOMASHOW LINDA S"/AU OR "THOMASHOW LINDA SIBLEY"/AU)

=> E DELANEY S/AU

=> S E3,E6,317-E19

9882 E3  
5970 E6  
7674 317  
434 E19  
L25 0 E3,E6,317-E19  
(E3(W)E6(W)317(W)E19)

=> S E3,E6,E17-E19

8 "DELANEY S"/AU  
4 "DELANEY S M"/AU  
2 "DELANEY SHANNON"/AU  
1 "DELANEY SHANNON L"/AU  
7 "DELANEY SHANNON M"/AU  
L26 22 ("DELANEY S"/AU OR "DELANEY S M"/AU OR "DELANEY SHANNON"/AU OR  
"DELANEY SHANNON L"/AU OR "DELANEY SHANNON M"/AU)

=> E MAVRODI D/AU

=> S E5-E9

1 "MAVRODI DIMITRI"/AU  
1 "MAVRODI DIMITRI V"/AU  
1 "MAVRODI DMITRI"/AU  
1 "MAVRODI DMITRI M"/AU  
15 "MAVRODI DMITRI V"/AU  
L27 19 ("MAVRODI DIMITRI"/AU OR "MAVRODI DIMITRI V"/AU OR "MAVRODI  
DMITRI"/AU OR "MAVRODI DMITRI M"/AU OR "MAVRODI DMITRI V"/AU)

=> E WELLER D/AU

=> S E3,E5,E8,E9,E14-E23

182 "WELLER D"/AU  
3 "WELLER D E"/AU  
1 "WELLER D L"/AU  
16 "WELLER D M"/AU  
3 "WELLER DAVID"/AU  
2 "WELLER DAVID E"/AU  
3 "WELLER DAVID E JR"/AU  
1 "WELLER DAVID EARL JR"/AU  
1 "WELLER DAVID H"/AU  
5 "WELLER DAVID J"/AU  
26 "WELLER DAVID L"/AU  
1 "WELLER DAVID L M"/AU  
39 "WELLER DAVID M"/AU  
1 "WELLER DAVID MICHAEL"/AU  
L28 284 ("WELLER D"/AU OR "WELLER D E"/AU OR "WELLER D L"/AU OR "WELLER  
D M"/AU OR "WELLER DAVID"/AU OR "WELLER DAVID E"/AU OR "WELLER  
DAVID E JR"/AU OR "WELLER DAVID EARL JR"/AU OR "WELLER DAVID  
H"/AU OR "WELLER DAVID J"/AU OR "WELLER DAVID L"/AU OR "WELLER  
DAVID L M"/AU OR "WELLER DAVID M"/AU OR "WELLER DAVID MICHAEL"/A  
U)

=> S L24,L26,L27,L28

L29 333 (L24 OR L26 OR L27 OR L28)

=> S L29 AND L8

L30 36 L29 AND L8

=> S L30 NOT (L17,L21)

L31 33 L30 NOT ((L17 OR L21))

=> D 1-33 TI

=> S L31

L32 33 L30 NOT ((L17 OR L21))

=> D L31 25 CBIB ABS

L31 ANSWER 25 OF 33 CAPLUS COPYRIGHT 2005 ACS on STN

1992:525822 Document No. 117:125822 Cloning and heterologous expression of the phenazine biosynthetic locus from *Pseudomonas aureofaciens* 30-84. Pierson, Leland S., III; Thomashow, Linda S. (Root Dis. Biol. Control Res. Unit, U.S. Dep. Agric., Pullman, 99164-6430, USA). Molecular Plant-Microbe Interactions, 5(4), 330-9 (English) 1992. CODEN: MPMIEL. ISSN: 0894-0282.

AB *P. aureofaciens* strain 30-84 suppresses take-all diseases of wheat caused by *Gaeumannomyces graminis* var. *tritici*. Three antibiotics, phenazine-1-carboxylic acid, 2-hydroxyphenazine-1-carboxylic acid, and 2-hydroxyphenazine, were responsible for disease suppression. Tn5-induced mutants deficient in production of one or more of the antibiotics (Phz-) were significantly less suppressive than was the parental strain. Cosmids pLSP259 and pLSP282 from a genomic library of strain 30-84 restored phenazine production and fungal inhibition to 10 different Phz- mutants. Sequences required for production of the phenazines were localized to a segment of approx. 2.8 kilobases that was present in both cosmids. Expression of this locus in *Escherichia coli* required the introduction of a functional promoter, was orientation-specific, and resulted in the production of all 3 phenazine antibiotics. Apparently, the cloned sequences encode a major portion of the phenazine biosynthetic pathway.

|    | L # | Hits  | Search Text   | DBs                    |
|----|-----|-------|---------------|------------------------|
| 1  | L1  | 2     | PHZO          | US-<br>PGPUB;<br>USPAT |
| 2  | L2  | 7420  | PHENAZINE     | US-<br>PGPUB;<br>USPAT |
| 3  | L3  | 0     | PHZO          | US-<br>PGPUB;<br>USPAT |
| 4  | L4  | 2135  | MONOOXYGENASE | US-<br>PGPUB;<br>USPAT |
| 5  | L5  | 38742 | PSEUDOMONAS   | US-<br>PGPUB;<br>USPAT |
| 6  | L6  | 166   | L4 SAME L5    | US-<br>PGPUB;<br>USPAT |
| 7  | L7  | 75    | L4 NEAR5 L5   | US-<br>PGPUB;<br>USPAT |
| 8  | L8  | 2     | L1            | US-<br>PGPUB;<br>USPAT |
| 9  | L9  | 75    | L7 AND L4     | US-<br>PGPUB;<br>USPAT |
| 10 | L10 | 15    | L7 NEAR5 L4   | US-<br>PGPUB;<br>USPAT |
| 11 | L11 | 17    | L6 AND L2     | US-<br>PGPUB;<br>USPAT |